

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: SASAKI et al. ) Group Art Unit: 1781  
Application No. 10/571,266 )  
Filed: September 3, 2006 ) Examiner: JYOTI CHAWLA  
For: PROCESS FOR PRODUCING ) Confirmation No.: 6102  
MODIFIED GUM ARABIC )



Commissioner for Patents

PO Box 1450

Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. § 1.132

I, Tsuyoshi KATAYAMA, do hereby make the following declaration:

1. I am a Japanese citizen, residing at 1-1-11, Sanwa-cho, Toyonaka, Osaka, 561-8588, Japan.
2. I graduated from Okayama University, Faculty of Agriculture, Department of Agricultural Chemistry in 1992. I also graduated from the Graduate School of Natural Science and Technology and received a master's degree in 1994.
3. I also graduated from the Graduate School of Natural Science and Technology and received a PhD in 2006.
4. I began my employment with SAN-EI GEN F. F. I., INC., the assignee of the above-identified application, in April 1994. Since 1994, I have been engaged in the research and development of emulsions and emulsifiers. I am in charge of research and development regarding natural emulsifiers, such as gum arabic.

5. I am one of the named inventors of the above-identified application and am familiar with the subject matter of the application as well as the disclosures in the cited references.

In order to compare the present invention and the prior art teachings, I have conducted the following experiments.

### Experiments

#### Purposes:

The purpose of these experiments is to evaluate emulsifying ability, coloration degree, forming syrupy masses, and caking of modified gum arabic samples, which are obtained by heating gum arabic samples having different loss-on-drying (i.e., 14.5% and 2.5%).

#### Methods:

##### (1) Materials

Two types of gum arabic (unmodified) samples with different loss-on-drying (sample 1: 14.5%, sample 2: 2.5%) (described below) were prepared from the same gum arabic beads (*Acacia senegal*), and 300 g of each of the gum arabic samples was heated at 80°C to 190°C for 3 to 12 hours while slowly being rotated with a rotary evaporator. For the obtained gum arabic samples, an emulsifying ability [average particle diameter (median diameter) ( $\mu\text{m}$ )], and appearance (i.e., caking or forming syrupy masses) were measured in the same manner as in Experimental Example 1.

Samples: Gum arabic (unmodified)

- 1) Pulverized gum arabic beads (14.5% of loss-on-drying; particle diameter of 0.1 mm to 2

mm, average particle diameter of 1.5 mm)

- 2) Pulverized gum arabic beads (2.5% of loss-on-drying; particle diameter of 0.1 mm to 2 mm, average particle diameter of 1.5 mm)

(2) Experimental Results

The results are shown in Table I.

Table I

Heating temperature	Heating time	Sample 1. Pulverized particles (particle diameter of 1.5 mm): loss-on-drying of 14.5%			Sample 2. Pulverized particles (particle diameter of 1.5 mm): loss-on-drying of 2.5%		
		Emulsifiability (median: $\mu\text{m}$ )	Coloration degree	Conditions (caking or forming syrupy masses)	Emulsifiability (median: $\mu\text{m}$ )	Coloration degree	Conditions (caking or forming syrupy masses)
Untreated	0 hours	1.42	7	Neither	1.4	7.4	Neither
80°C	3 hours	1.42	8	Almost caking	1.42	7.2	Neither
	6 hours	1.4	10.2	Caking	1.4	7.3	Neither
	12 hours	1.36	11	Caking	1.39	7.7	Neither
100°C	3 hours	1.38	13.5	Heavy caking	1.33	8.5	Neither
	6 hours	1.25	17.8	Heavy caking	1.1	9.8	Neither
	12 hours	1.16	26.8	Complete caking	0.85	11.2	Neither
150°C	3 hours	Unmeasurable	Heavily browned*	The pulverized particles were dissolved like sticky syrup, forming a large number of syrupy masses. After cooling, the masses were completely solidified, stuck to the vessel, and unable to be removed. Emulsifiability was thus unmeasurable, and the coloration degree was only visually evaluated.	0.68	16.6	Neither
	6 hours	Unmeasurable	Heavily browned*		0.67	23.3	Neither
	12 hours	Unmeasurable	Heavily browned*		0.75	28	Neither
190°C	3 hours	Unmeasurable	Heavily browned*	The pulverized particles were dissolved like sticky syrup, forming a large syrupy mass as a whole. After cooling, the mass was completely solidified, stuck to the vessel, and unable to be removed. Emulsifiability was thus unmeasurable, and the coloration degree was only visually evaluated.	3.86 (The amount of gel component was high. Oil was separated after 1 day of storage due to poor emulsification.)	33.2 Partially burned	No caking (Large amount of water-insoluble gel was produced.)

\* Coloration greater than the coloration degree of 33.2 of sample 2 when heated at 190°C for 3 hours.

The experimental results show that heating sample 1 having a loss-on-drying of 14.5% at 80°C did not improve the emulsifiability and caused a problem of caking. The results also show the occurrence of heavier caking when the heating temperature was higher than 80°C. In contrast, heating sample 2 having a loss-on-drying of 2.5% at a high temperature in the range of 80 to 190°C did not cause problems such as caking and forming syrupy masses, unlike the case in sample 1. The results also show that heating sample 2 having a loss-on-drying of 2.5% at a temperature higher than 80°C and lower than 190°C, particularly in the range of 100 to 150°C, improves the emulsifying ability of gum arabic without causing problems such as caking and forming syrupy masses. Further, it is clear that when sample 2 having a loss-on-drying of 2.5% was heated in the above temperature range, the coloration degree was significantly lower than that of sample 1 having a loss-on-drying of 14.5%, and that browning (brown coloration) was significantly suppressed.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of any patent issued on this application.

Date: May 10, 2011

By:

Tsuyoshi Katayama

Tsuyoshi KATAYAMA